

NEW LARVAL FOOD PLANTS FOR AUSTRALIAN HAWK MOTHS (LEPIDOPTERA: SPHINGIDAE)

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Abstract

New food plants are listed for 31 species of Australian hawk moths. Fifty-five of these food plant records are of native plant species and 17 are exotics. Three previously published food plant records for *Cephonodes kingii* (W.S. Macleay) and one for *Psilogramma menephron* (Cramer) are disputed, together with one for *Hoplitocnema brachycera* (Lower) that originates from a labelled museum specimen. A brief overview of the diversity of Australian hawk moth food plants is given.

Introduction

In previous papers (Moulds 1981, 1984) I summarised larval food plants for Australian hawk moths affecting garden ornamentals and commercial crops. However, many Australian hawk moth species have larvae that feed on neither ornamentals nor crops and this paper lists known food plants for a number of these in addition to unrecorded food plants for species treated previously. Food plants listed by Common (1990) are not repeated.

The following abbreviations are used when listing names of observers with several records: AJG, Alan Graham; GS, G. Sankowsky; JO, J. Olive; MSM, M. S. Moulds.

Nomenclature for sphingid species follows that of Moulds (1996). Plant names follow Henderson (1997), otherwise Brock (1988) or Bailey *et al.* (1976). Exotic plant species are marked by an asterisk (*).

Food plant identifications originating from H. Beste, AJG, GS, D. Lane, MSM, JO, C. Pratt, P. Valentine and A. Walford-Huggins were provided by Tony Irvine, CSIRO, Forest Research Station, Atherton or Garry Sankowsky, Yuruga Nursery, Walkamin. Moth identifications were obtained by rearing larvae to adults; doubtful adult identifications were confirmed by the author.

New records

Acosmeryx miskini (Murray)

VITACEAE

Cayratia clematidea (F. Muell.) Domin "wild grape" [GS, Tolga, Qld; A. Hiller, Mt Glorious, Qld]

Agrius godarti W.S. Macleay

CONVOLVULACEAE

**Ipomoea batatas* (L.) Lam. "sweet potato" [MSM - Larvae were not found naturally on this plant but several reared from eggs successfully developed to adults.]

***Cephonodes hylas* (Linnaeus)**

Add to the records listed by Moulds (1984) the following:

RUBIACEAE

Pavetta granitica Bremek. [D. Lane and MSM, Dimbulah; GS, Tolga, Qld]

Psychotria sp. "wild coffee" [Anne Garrett, Rockhampton district, Qld]

***Cephonodes kingii* (W.S. Macleay)**

Add to the records listed by Moulds (1984) and Common (1990) the following:

RUBIACEAE

Gardenia ochreatea F. Muell. "scented gardenia bush" [GS, Chillagoe and Georgetown, Qld]

Gardenia ovularis F. M. Bailey [GS, Tolga, Qld]

Tarenna sp. [GS, Tolga, Qld]

NOTE: Jones and Elliot (1995) list *Cissus*, *Grevillea* and *Oreocallis* as food plants. *Oreocallis* was previously known as *Embothrium* and now as *Alloxylon*. All stem from old inaccurate records and should be disregarded (see Moulds 1984: 60).

***Cephonodes picus* (Cramer)**

Add to the records listed by Moulds (1984) and Common (1990) the following:

RUBIACEAE

Aidia racemosa (Cav.) Tirveng. [Anne Garrett, Rockhampton district, Qld]

***Coenotes eremophilae* (T. P. Lucas)**

Add to records listed by Moulds (1984) and Common (1990) the following:

ACANTHACEAE

**Barleria cristata* L. "Philippine violet" [E. A. Henty, Kununurra, WA]

RUBIACEAE

**Mussaenda* sp. [E. A. Henty, Kununurra, WA]

VERBENACEAE

Stachytarpheta urticifolia (Salisb.) Sims "ratstail" "dark blue snakeweed" [E. A. Henty, Kununurra, WA]

Vitex glabrata R. Br. [Cliff Meyer, Kununurra, WA]

***Coequosa triangularis* (Donovan)**

Add to the records listed by Moulds (1981) the following:

PROTEACEAE

Grevillea asplenifolia x *caleyi* 'ivanhoe' [N. Marks, Pennant Hills, NSW]

Hakea spp. [McMaugh (1985, 1986)]

Persoonia levis (Cav.) Domin [Bruce White, Doyalson, NSW - Rose (1975) fed *P. levis* to newly hatched larvae which died. The discovery of larvae feeding naturally on this plant by White confirms it is a larval food plant.]

***Daphnis hypothous* (Cramer)**

APOCYNACEAE

Alstonia actinophylla (A. Cunn.) K. Schum. "milkwood" [G. Brown and MSM, Darwin, NT]

Alstonia constricta F. Muell. "bitterbark" [GS, Tolga, Qld]

Alstonia muelleriana Domin "hard milkwood" [MSM, Julatten, Qld]

Alstonia scholaris (L.) R. Br. "milky bean", "milky pine" [MSM, Julatten, Qld]

RUBIACEAE

**Anthocephalus chinensis* (Lam.) A. Rich ex Walp. [Gary Fitt, Darwin, NT - a tree grown experimentally for commercial use near Darwin; larvae completely defoliated some plants.]

Nauclea orientalis (L.) L. "Leichhardt tree" [Gary Fitt, Kununurra, WA; P. Valentine, Townsville, Qld]

***Daphnis placida* (Walker)**

Add to the records listed by Common (1990) the following:

ALANGIACEAE

Alangium villosum subsp. *polysmoides* (F. Muell.) Bloemb. [J. Stockard, Wingham Brush, NSW]

Alangium villosum subsp. *tomentosum* (F. Muell.) Bloemb. [GS, Burnett R. and Wallaville, Qld]

APOCYNACEAE

Alstonia actinophylla (A. Cunn.) K. Schum. [C. Pratt, MSM, Cooktown, Qld; G. Brown, Darwin, NT]

Alstonia muelleriana Domin "hard milkwood" [MSM, Julatten, Qld]

Alstonia scholaris (L.) R. Br. "milky bean", "milky pine" [MSM, Julatten, Qld]

**Tabernaemontana divaricata* (L.) R. Br. "mock gardenia" [GS, Tolga, Qld]

Ochrosia elliptica Labill. [GS, Tolga, Qld]

***Daphnis protrudens* (Felder)**

RUBIACEAE

Timonius timon (Spreng.) Merr. var *timon* [GS, Windsor Tableland, Qld]

***Eupanacra splendens* (Rothschild)**

Add to the records listed by Moulds (1984) the following:

ARACEAE

**Monstera deliciosa* Liebm. "monstera" [Dennis Kitchen, JO, Cairns, Qld]

Rhaphidophora australasica F. M. Bailey [H. Beste, Julatten, Qld]

***Hippotion boerhaviae* (F.)**

RUBIACEAE

Hedyotis sp. [JO, Trinity Beach, Qld]

**Pentas lanceolata* (Forssk.) Deflers "pentas" [JO, Trinity Beach, Qld - larvae were not found naturally on *Pentas* but readily accepted it when transferred from *Hedyotis*]

***Hippotion brennus* (Stoll)**

DILLENACEAE

Hibbertia scandens (Willd.) Gilg "golden guinea vine" "snake vine" [JO, Kuranda, Qld]

RUBIACEAE

**Pentas lanceolata* (Forssk.) Deflers "pentas" [JO, Trinity Beach, Qld]

Pogonolobus reticulatus F. Muell. [JO, Trinity Beach, Qld]

***Hippotion rosetta* (Swinhoe)**

RUBIACEAE

**Pentas lanceolata* (Forssk.) Deflers "pentas" [D. Lane, Atherton, Qld]

**Richardia brasiliensis* Gomes "Mexican clove" "white eye" [AJG, Yorkeys Knob, Qld]

**Richardia scabra* L. [AJG, Yorkeys Knob, Qld]

Spermacoce exserta Benth. [Cliff Meyer, Darwin, NT]

VITACEAE

Cayratia clematidea (F. Muell.) Domin "wild grape" [AJG, Yorkeys Knob, Qld]

***Hippotion scrofa* (Boisduval)**

Add to the records of Moulds (1981, 1984) the following:

ASTERACEAE

**Xanthium spinosum* L. "Bathurst burr" [G. Brown, Cootamundra, NSW - identification uncertain; record requires confirmation]

RUBIACEAE

Hedyotis sp. [JO, Trinity Beach, Qld]

Spermacoce exserta Benth. [Cliff Meyer, Darwin, NT]

***Hopliocnema brachycera* (Lower)**

MYOPORACEAE

Eremophila willsii F. Muell. (MSM, Wallara Stn, NT)

Eremophila exotrachys Kraenzlin (MSM, Wallara Stn, NT)

CASUARINACEAE

A data label attached to a specimen in the South Australian Museum states that it was reared from *Casuarina*. As larvae feed on *Eremophila* it is most unlikely that *Casuarina* is a food plant and the record is here disregarded.

***Hyles livornicoides* (Lucas)**

Add to the records listed in Moulds (1981) the following:

FABACEAE

*?*Medicago [sativa]* L. "lucerne" [Lower (1897) - a doubtful record that requires confirmation]

***Leucomonia bethia* (Kirby)**

VERBENACEAE

Clerodendrum floribundum R. Br. "lollybush" [GS, Walsh River, Mareeba district, Qld]

***Macroglossum alcedo* (Boisduval)**

RUBIACEAE

Hodgkinsonia frutescens C. T. White [GS, MSM. Tolga, Wongabel S. F. and Yungaburra, Qld]

***Macroglossum dohertyi* (Rothschild)**

RUBIACEAE

Myrmecodia platytyrea subsp. *antoinii* (Becc.) C. R. Huxley & Jebb "ant plant" [D. Lane, Iron Range, Qld]

***Macroglossum micaceum* (Walker)**

RUBIACEAE

Canthium sp. [GS, JO, Forty Mile Scrub, Qld]

***Macroglossum prometheus* (Boisduval)**

RUBIACEAE

Morinda citrifolia L. "cheese fruit" "great morinda" [AJG, Yorkeys Knob, Qld]

***Macroglossum tenebrosa* (T.P. Lucas)**

RUBIACEAE

Morinda salomonensis Engl. [D. Kitching, Kuranda, Qld]

***Macroglossum vacillans* (Walker)**

LOGANIACEAE

Strychnos lucida R. Br. "strychnine tree" [GS, Myall Ck (=York Downs), Cape York Pen., Qld]

***Meganoton rufescens* (Butler)**

Add to the records listed in Moulds (1984) the following:

ANNONACEAE

**Annona muricata* L. "soursop" [R. Straatman and MSM, Kuranda, Qld]

***Psilogamma menephron menephron* (Cramer)**

Add to the records listed in Moulds (1981, 1984) the following:

BIGNONIACEAE

Deplanchea tetraphylla (R. Br.) F. Muell. "golden bouquet tree" [JO, Trinity Beach, Qld]

**Radermachera sinica* (Hance) Hemsl. [J. McMaugh and C. Cassar, Sydney, NSW]

CASUARINACEAE

Walker (1856) formalized the name *Macrosila casuarinae* from a Boisduval manuscript name; this is now considered a junior synonym of *Psilogamma menephron*. Boisduval [1875] gives *Casuarina* as a larval food plant. A complete absence of other Australian records for this common moth from such an abundant plant suggests Boisduval's record is erroneous. Further, I have been unable to persuade young larvae to feed on *Casuarina*. However, Robinson (1975) records *Psilogamma jordana* B-Bkr in Fiji as feeding on *Casuarina nodiflora*. Despite this contradiction I believe the evidence dismissing *Casuarina* as a food plant for *P. menephron* outweighs the likelihood of this ancient record being correct and I here disregard the record in the absence of further evidence.

OLEACEAE

Jasminum didymum subsp. *lineare* (R. Br.) P. S. Green [MSM, Townsville district, Qld]

**Osmanthus fragans* (Thunb.) Lour. "fragrant olive" [J. McMaugh, Sydney, NSW]

VERBENACEAE

**Citharexylum hydalglense* [A. B. Rose, Forster, NSW]

Clerodendrum cunninghamii Benth. [GS, Mt Gravatt, Qld]

Clerodendrum tomentosum (Vent.) R. Br. "lolly bush" [C. N. Smithers, Sydney, NSW]

**Duranta repens* L. "golden-dewdrop" "pigeon berry" [A. B. Rose, Forster; J. McMaugh, Sydney, NSW]

Vitex glabrata R. Br. [Cliff Meyer, Kununurra, WA]

Vitex trifolia L. [Gordon Jones, Roebourne, WA; J. McMaugh, Sydney, NSW]

Synoecha marmorata Rothschild & Jordan

MYOPORACEAE

Eremophila mitchellii Benth. "sandalbox", "budda", "false sandalwood", "bastard sandalwood", "emu bush" [Lucas 1891]

Theretra latreillii (W.S. Macleay)

Add to the records listed in Moulds (1981, 1984) the following:

RUBIACEAE

**Pentas lanceolata* (Forssk.) Deflers "pentas" [JO, Cairns, Qld - larvae were not found on pentas but those transferred from other food plants readily accepted it.]

VITACEAE

Cissus opaca F. Muell. "pepper vine" [J. Moss, Brisbane, Qld]

Theretra oldenlandiae (F.)

Add to the records listed in Moulds (1981, 1984) the following:

ARACEAE

**Zantedeschia aethiopica* (L.) K. Spreng. "arum lily" [MSM, Brisbane, Qld]

RUBIACEAE

Hedyotis sp. [JO, Trinity Beach, Qld]

Theretra queenslandi (T.P. Lucas)

URTICACEAE

Dendrocnide excelsa (Wedd.) Chew "giant stinging tree" "fibrewood" [Clyne (1980); John Stockard, Wingham, NSW; AJG, Toowoomba, Qld; A. Hiller, Mt Glorious, Qld]

Dendrocnide moroides (Wedd.) Chew "gimpi gimpi" "gympie" [A. Walford-Huggins, Tully Falls, Qld]

Dendrocnide photinophylla (Kunth) Chew "shining-leaved stinging tree" "mulberry-leaved stinging tree" "fibrewood" [GS, Mt Tamborine, Qld; Anne Garrett, Rockhampton district, Qld.]

Pipturus argenteus (G. Forst.) Wedd. "native mulberry" [GS, Tolga, Qld; AG, Kuranda, Qld.]

Theretra silhetensis (Walker)

ONAGRACEAE

**Lugwigia octovalvis* (Jacq.) P. H. Raven "water primrose" [J. Moss, Brisbane, Qld; GS, Eurimbulah, Qld]

RUBIACEAE

Hedyotis sp. [JO, Trinity Beach, Qld]

**Pentas lanceolata* (Forssk.) Deflers "pentas" [JO, Trinity Beach, Qld - larvae not found naturally on pentas but readily accepted it when transferred from *Hedyotis*]

VITACEAE

Cayratia clematidea (F. Muell.) Domin [AJG, Yorkeys Knob, Qld]

Discussion

Forty-three of the 64 Australian hawk moth species now have larval food-plant records of Australian origin. A further five species have food-plant records from localities beyond Australia, viz.: *Hippotion rosetta* (Swinhoe) on *Boreria* and *Oldenlandia* (Holloway 1987); *Macroglossum corythus* (Walker) on *Strychnos*, *Guettarda*, *Morinda* and *Paederia* (Holloway 1987); *M. heliophila* (Boisduval) on *Morinda* and *Psychotria* (Holloway 1987); *M. insipida* (Butler) on *Hedyotis*, *Borreria*, *Spermacoce* and *Corchorus* (Holloway 1987); and *Theretra nessus* (Drury) on *Dioscorea*, *Ipomoea*, *Amaranthus*, *Impatiens*, *Citrullus*, *Arachis*, *Boerhavia*, *Knoxia*, *Morinda*, *Oldenlandia*, *Spermacoce*, *Glossostigma* and *Camellia* (Holloway 1987, Mackey 1975, Seitz 1928-29). Food-plant records for the remaining 15 Australian hawk moth species are lacking.

Known Australian food plants now total 196 species in a remarkable 122 genera and 43 families. The Rubiaceae (34 spp) has by far the highest representation followed by Bignoniaceae (15 spp), Vitaceae (15 spp) and Oleaceae (14 spp). The Rubiaceae support 22 Australian hawk moth species, more than for any other plant family. In comparison, the Vitaceae support 11 species but the Bignoniaceae only four and the Oleaceae just one.

One third of the known Australian food plants are introduced, 66 species in all spread across 23 families. Previously I have discussed the polyphagous nature of some Australian hawk moths (Moulds 1981), notably *Gnathothlibus erotus* (Cramer), *Hippotion celerio* (L.), *Psilogramma menephron*, *Theretra latreillii* and *T. oldenlandiae*. These five species account for 49 of the introduced plants and *P. menephron* alone for 25. These moths are all wide-ranging species with distributions extending at least throughout the Indo-Australian region.

The 17 hawk moths endemic to Australia (a quarter of all Australian species) together feed on 66 species in 21 families but only nine of these plants are exotics. *Coenotes eremophilae* is an exception amongst the Australian endemic hawk moths, in that it has a large food-plant range (27 species in 13 families) accounting for 26 of the 66 species, and 7 of the 21 families above. However, the plants that it feeds on are in families that are for the most part closely related, and all but three are Australian natives.

To draw conclusions at this time about the diversity of Australian hawk moth food plants would be premature in view of the incomplete knowledge available. However, two trends are worth noting. Firstly, those hawk moths

with the widest distributions also tend to have the broadest range of food plants. *Hippotion celerio*, for example, is a cosmopolitan moth reaching the British Isles and North America, and from Australia alone it is recorded feeding on 25 species in 10 families. Among the Australian endemics *Coenotes eremophilae* has by far the widest distribution occurring throughout much of mainland Australia, and it has by far the highest food plant diversity as noted above. An exception to this trend seems, at first, to be *Agrius convolvuli* (L.) which, like *H. celerio*, is cosmopolitan but has comparatively few Australian food-plant records. However, throughout its world-wide distribution its larvae feed on a wide range of plants covering 7 families (Holloway 1987). In contrast, narrow-range species such as *Hopliocnema brachycera*, *Synoecha marmorata* (T. P. Lucas) and *Coequosa triangularis* are each known to feed on plants in just one family.

Secondly, there is a tenuous correlation between the abundance of a species and its food-plant diversity. Common species tend to have a range of food plants spanning several families. For example, *Psilogramma menephron* (38 species in 6 families), *Theretra oldenlandiae* (25 species in 8 families) and *Gnathothlibus erotus* (17 species in 6 families). Less abundant hawk moths have food plants which tend to be closely related. For example *Coequosa triangularis* is known to feed on nine different plants but all within the Proteaceae. The seven Australian *Macroglossum* species for which food plants are known are all uncommon; together they have 10 known food plants, nine of which are in the Rubiaceae and one in Loganiaceae.

One would expect some kind of correlation between the systematic positions of hawk moths and their food plants but there is no obvious broad-based association in this regard. This subject is a complex one and falls beyond the scope of this paper and is not pursued here.

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